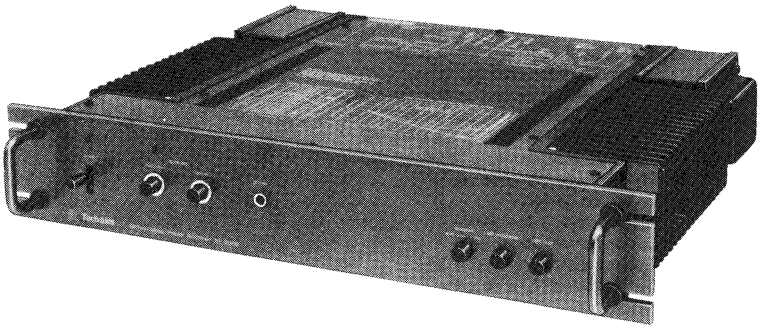
ORDER NO. SD7708-1257

Service Manual

Stereo/Mono Power Amplifier

SE-9060

(X), (XM), (XG), (XGH), (XGF), (XSD), (XSW), (XE)



The model SE-9060 (X) is available in Asia, Latin America, Middle East and Africa only.
The model SE-9060 (XM) is Panama and Mexico only.
The model SE-9060 (XG) is available in European only.
The model SE-9060 (XGH) is available in Holland only.
The model SE-9060 (XGF) is available in France only.
The model SE-9060 (XSD) is available in Scandinavia only.
The model SE-9060 (XSW) is available in Switzerland only.
The model SE-9060 (XE) is available in England only.

TECHNICAL SPECIFICATIONS (Specifications are subject to change without notice for further improvement.)

[DIN 45 500]

1 kHz continuous power	
stereo operation (both channels driven)	2 x 100 W (4Ω) 2 x 75 W (8Ω)
monaural (BTL) operation	200 W (8Ω)
40 Hz ~ 16 kHz continuous power	
stereo operation (both channels driven)	2 x 90 W (4Ω) 2 x 70 W (8Ω)
monaural (BTL) operation	180 W (8Ω)
20 Hz ~ 20 kHz continuous power	
stereo operation (both channels driven)	2 x 90 W (4Ω) 2 x 70 W (8Ω)
monaural (BTL) operation	180 W (8Ω)
Power bandwidth	
both channels driven at 4Ω	5 Hz ~ 40 kHz, –3 dB
both channels driven at 8Ω	5 Hz ~ 50 kHz, –3 dB
Total harmonic distortion	
rated power at 1 kHz	0.02% (4Ω, 8Ω)
rated power at 40 Hz ~ 16 kHz	0.02% (4Ω, 8Ω)
rated power at 20 Hz ~ 20 kHz	0.02% (4Ω, 8Ω)
half power at 1 kHz	0.0015% (4Ω, 8Ω)
–26 dB rated power at 1 kHz	0.02% (4Ω)
50 mW power at 1 kHz	0.02% (4Ω)

Intermodulation distortion	
rated power at 250 Hz : 8 kHz = 4 : 1	0.02% (4Ω)
rated power at 60 Hz : 7 kHz = 4 : 1	0.02% (8Ω)
Frequency response	20 Hz ~ 20 kHz, +0 dB –0.05 dB 0 Hz ~ 100 kHz, +0 dB –1 dB
S/N (IHF, A)	120 dB
Residual hum & noise	100μV, 25μV (IHF, A)
Damping factor stereo operation	50 (4Ω), 100 (8Ω)
monaural (BTL) operation	50 (8Ω)
Input sensitivity & impedance	1V/47 kΩ
Load impedance stereo operation MAIN or REMOTE	4 ~ 16Ω
MAIN + REMOTE	8 ~ 16Ω
monaural (BTL) operation	8 ~ 16Ω
Channel balance	±0.1 dB
Channel separation	80 dB
Headphones level & output impedance	480mV/390Ω
Power consumption	500 W 650 W (For United Kingdom)
Power supply (50/60 Hz)	220V/240V or 120V
Dimensions (W x H x D)	450 x 92 x 376mm (17-23/32" x 3-5/8" x 14-13/16")
Weight	12.0 kg (26.5 lb.)

TECHNISCHE DATEN (Spezifikationen können infolge von Verbesserungen ohne Ankündigung geändert werden.)

[DIN 45 500]

RMS-Dauertonleistung bei 1 kHz	
Stereo Betrieb (beide Kanäle zusammen ausgesteuert)	2 x 100 W (4Ω) 2 x 75 W (8Ω)
Mono Betrieb	200 W (8Ω)
RMS-Dauertonleistung bei 40Hz ~ 16 kHz	
Stereo Betrieb (beide Kanäle zusammen ausgesteuert)	2 x 90 W (4Ω) 2 x 70 W (8Ω)
Mono Betrieb	180 W (8Ω)
RMS-Dauertonleistung bei 20 Hz ~ 20 kHz	
Stereo Betrieb (beide Kanäle zusammen ausgesteuert)	2 x 90 W (4Ω) 2 x 70 W (8Ω)
Mono Betrieb	180 W (8Ω)
Leistungsbandbreite	
beide Kanäle zusammen ausgesteuert bei 4Ω	5 Hz ~ 40 kHz, –3 dB
beide Kanäle zusammen ausgesteuert bei 8Ω	5 Hz ~ 50 kHz, –3 dB
Harmonische Verzerrungen	
Nennleistung bei 1 kHz	0,02% (4Ω, 8Ω)
Nennleistung bei 40 Hz ~ 16 kHz	0.02% (4Ω, 8Ω)
Nennleistung bei 20 Hz ~ 20 kHz	0,02% (4Ω, 8Ω)
Halbwertleistung bei 1 kHz	0,0015% (4Ω, 8Ω)
–26 dB Ausgangsleistung bei 1 kHz	0,02% (4Ω)
50 mW Ausgangsleistung bei 1 kHz	0,02% (4Ω)

Intermodulationsverzerrung	
Nennleistung bei 250 Hz : 8 kHz = 4 : 1	0.02% (4Ω)
Nennleistung bei 60 Hz : 7 kHz = 4 : 1	0.02% (8Ω)
Frequenzgang	20 Hz ~ 20 kHz, +0 dB –0,05 dB 0 Hz ~ 100 kHz, +0 dB –1 dB
Fremdspannungsabstand (IHF, A)	120 dB
Hum & Noise	100μV, 25μV (IHF, A)
Dämpfungsfaktor Stereo Betrieb	50 (4Ω), 100 (8Ω)
Mono Betrieb	50 (8Ω)
Eingangsempfindlichkeit & impedanz	1V/47 kΩ
Endimpedanz Stereo Betrieb MAIN oder REMOTE	4 ~ 16Ω
MAIN + REMOTE	8 ~ 16Ω
Mono Betrieb	8 ~ 16Ω
Kanalabweichung	±0,1 dB
Kanaltrennung	80 dB
Kopfhörerpegel und Ausgangsimpedanz	480 mV/390Ω
Leistungsaufnahme	500 W
Netzspannung umschaltbar (50/60 Hz)	220V/240V oder 120 V
Abmessungen (B x H x T)	450 x 92 x 376 mm
Gewicht	12 kg

National Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

CARACTERISTIQUES TECHNIQUES

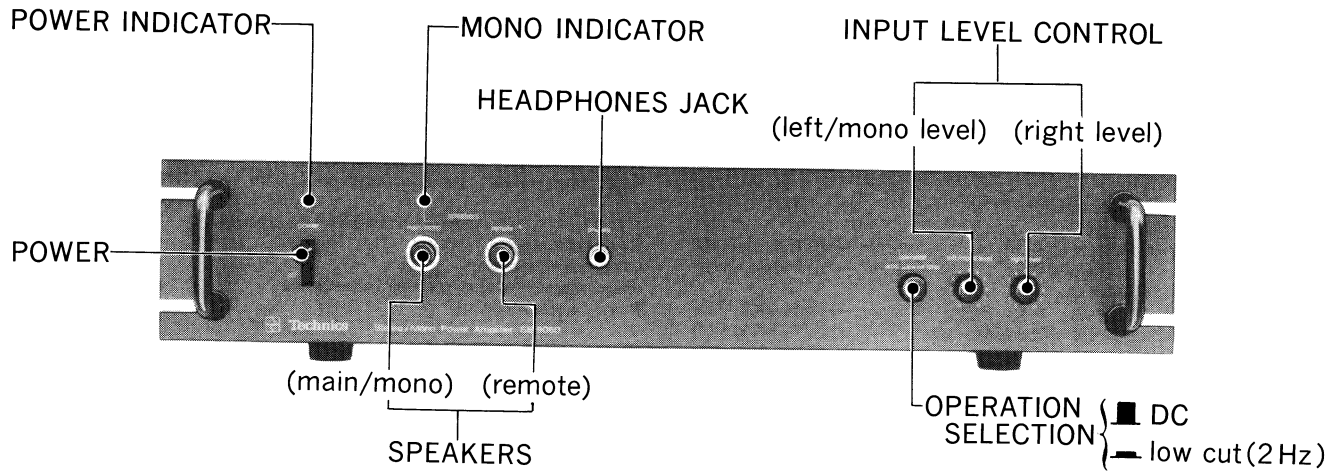
(Sujet à changement sans préaris.)

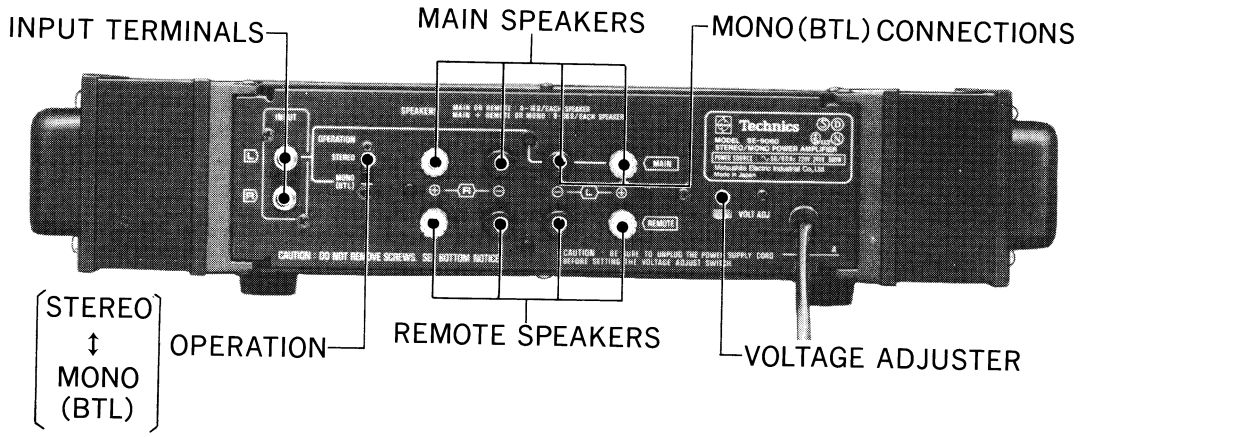
[DIN 45 500]

Puissance RMS (continue) à 1 kHz
Functionnement stéréophonique
(pour l'ensemble des canaux excités)
2 x 100 W (4Ω), 2 x 75 W (8Ω)
Functionnement monophonique 200 W (8Ω)
Puissance RMS (continue) à 40 Hz ~ 16 kHz
Functionnement stéréophonique
(pour l'ensemble des canaux excités)
2 x 90 W (4Ω), 2 x 70 W (8Ω)
Functionnement monophonique 180 W (8Ω)
Puissance RMS (continue) à 20 Hz ~ 20 kHz
Functionnement stéréophonique
(pour l'ensemble des canaux excités)
2 x 90 W (4Ω), 2 x 70 W (8Ω)
Functionnement monophonique 180 W (8Ω)
Largeur de bande de puissance
pour l'ensemble de canaux excités à 4Ω
5 Hz ~ 40 kHz, −3 dB
pour l'ensemble de canaux excités à 8Ω
5 Hz ~ 50 kHz, −3 dB
Distorsion harmonique totale
à la puissance nominale, 1 kHz 0.02% (4Ω, 8Ω)
à la puissance nominale, 40Hz ~ 16 kHz 0,02% (4Ω, 8Ω)
à la puissance nominale, 20 Hz ~ 20 kHz 0,02% (4Ω, 8Ω)
à demi-puissance, 1 kHz 0,0015% (4Ω, 8Ω)
pour une puissance mesurée de −26 dB, 1 kHz 0,02% (4Ω)
pour une puissance mesurée de 50mW, 1 kHz 0,02% (4Ω)

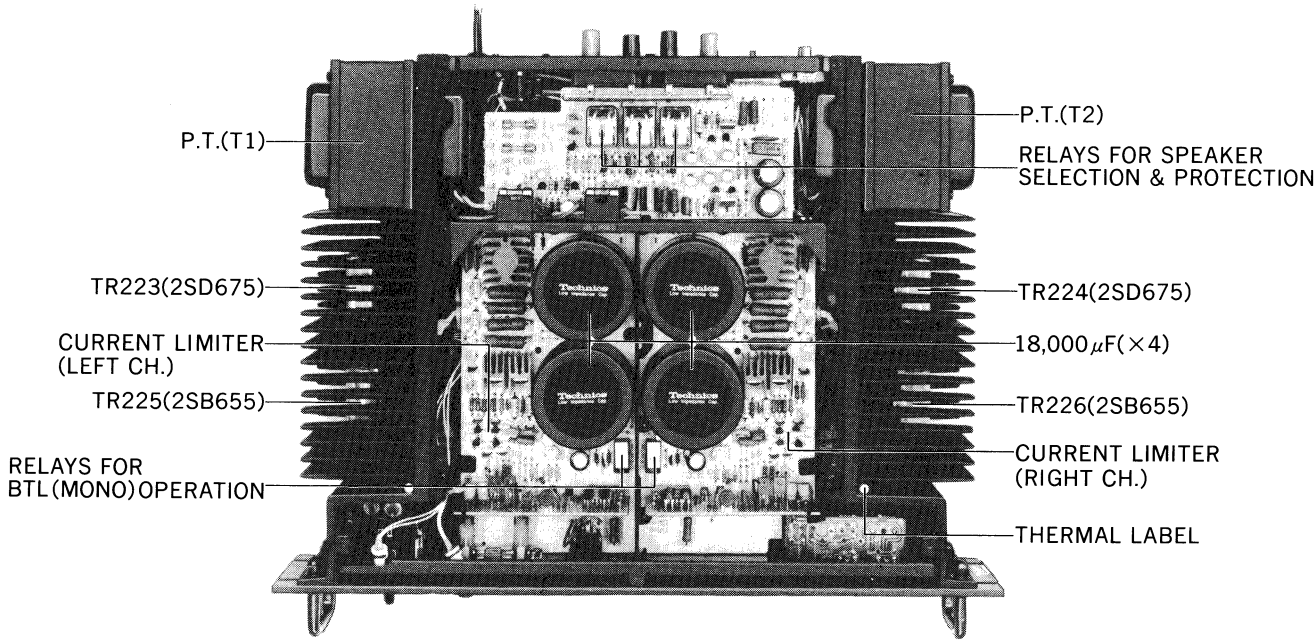
Distorsion d'intermodulation
pour une puissance mesurée à 250 Hz : 8 kHz = 4 : 1
0,02% (4Ω)
pour une puissance mesurée à 60 Hz : 7 kHz = 4 : 1
0,02% (8Ω)
Courbe de réponse 20 Hz ~ 20 kHz, +0 dB −0,05 dB
0 Hz ~ 100 kHz, +0 dB −1 dB
Rapport S/B (IHF, A) 120 dB
Tension résiduelle de bruit 100μV, 25μV (IHF, A)
Facteur d'amortissement
Functionnement stéréophonique 50 (4Ω), 100 (8Ω)
Functionnement monophonique 50 (8Ω)
Sensibilité et impédance d'entrée 1V/47kΩ
Impédance de charge
Functionnement stéréophonique
PRINCIPAL ou ELOIGNE 4Ω à 16Ω
PRINCIPAL + ELOIGNE 8Ω à 16Ω
Functionnement monophonique 8Ω à 16Ω
Equilibrage de canaux ±0,1 dB
Ecart de canaux 80 dB
Niveau des écouteurs et impédance de sortie 480mV/390Ω
Consommation 500 W
Alimentation (50/60 Hz) 220V/240V ou 120 V
Dimensions (L x H x Pr) 450 x 92 x 376 mm
Poids 12,0 kg

■ LOCATION OF CONTROLS





* For further remark, the products for [XM] are not provided with voltage adjuster.



■ BEFORE STARTING THE REPAIRING

- For repairing this unit, be particularly careful about the following points.
  Since 4 capacitors of large capacity at 18,000μF are employed for power source, charged voltage remains for a long period of time once the power supply is turned on, with danger of electric shock if the (+) and (−) power voltage line is touched with hands. Therefore, before repairing, be sure to short-circuit opposite poles of the 18,000μF capacitor (C501 ~C504) with a resistor approximately of "15Ω 10W" for discharging the charged voltage. Short-circuiting with a screw driver and the like is not only dangerous, but may destroy transistors and diodes, and should therefore be avoided.

■ ALIGNMENT INSTRUCTIONS

Conditions of set
1. Volume control to "Minimum"
2. Operation switch to "DC"
3. Stereo-monaural selector (Operation) switch to "Stereo"
4. Main & remote speakers switch to "ON (push)"

Connection of DC voltmeter	Portions to be adjusted	Adjusting procedures
1. ADJUSTMENT OF POSITIVE VOLTAGE (+B POWER SUPPLY)		
To be connected between TP1 (+side) and TP3 (−side) terminals.	VR401	• To be adjusted to (+)55V. • Check to be sure that voltage between TP2 and TP3 is (−)55V.
2. ADJUSTMENT OF SPEAKER TERMINAL DC BALANCE		
Make connections to left and right channel speaker terminals.	VR101 (left channel) VR102 (right channel)	Adjust to 0mV at as small a range as possible.
3. ICQ (IDLING OF POWER TRANSISTOR) ADJUSTMENT		
(Left channel) ..... Connect between TP4 (+side) and TP5 (−side) terminals. (Right channel)..... Connect between TP6 (+side) and TP7 (−side) terminals.	VR201 (left channel) VR202 (right channel)	• Make adjustment over 5 minutes after turning "ON" the power source. • Adjust to 20mV.

In the case where ICQ adjustment is made through current adjustment by the circuit tester.
(In this case, the DC voltmeter is not required.)

Note:
1. For using the circuit tester, be sure to turn the power source "OFF" for discharging the charge voltage as in "Before starting the repairing"
2. Subsequently, connect the circuit tester perfectly so as not to be disengaged.
3. After adjustments also, the lead wires should be perfectly soldered as in the original state, only after turning "OFF" of the power source.
4. Adjustments should be made about 5 minutes after turning "ON" of the power source.

*** In the case of left channel**

1 Remove the bottom board of the set.
2 Remove the lead wire of the (–) side of the power supply electrolytic capacitor (C503), connect the (–) terminal of an ammeter (circuit tester) to the (–) terminal of the electrolytic capacitor (C503), and connect the (+) terminal of the ammeter (circuit tester) to the lead wire. (Refer to fig. 2)
3 Adjust **VR201** to reach 25 ~ 30mA. (may differ to a certain extent depending on internal impedance of the circuit tester.)

*** In the case of right channel**

1 Remove the lead wire of the (–) side of the power supply electrolytic capacitor (C504), connect the (–) terminal of an ammeter (circuit tester) to the (–) terminal of the electrolytic capacitor (C504), and connect the (+) terminal of the ammeter (circuit tester) to the lead wire. (Refer to fig. 2)
2 Adjust **VR202** to reach 25 ~ 30mA. (may differ to a certain extent depending on internal impedance of the circuit tester.)

■ ALIGNMENT POINTS

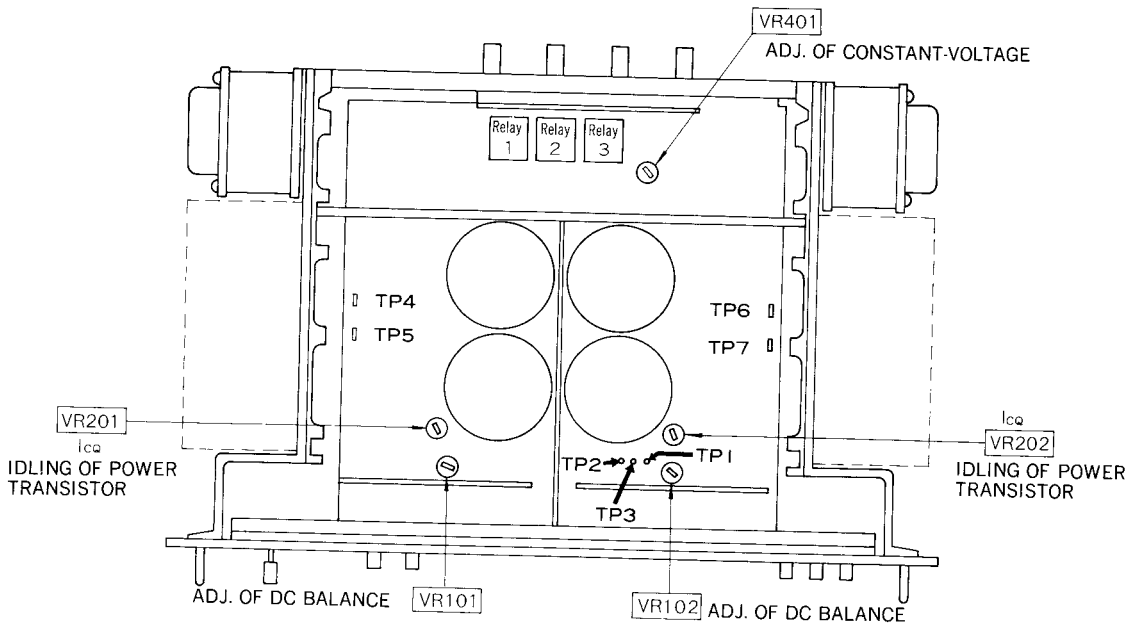


Fig. 1 (Abb. 1)

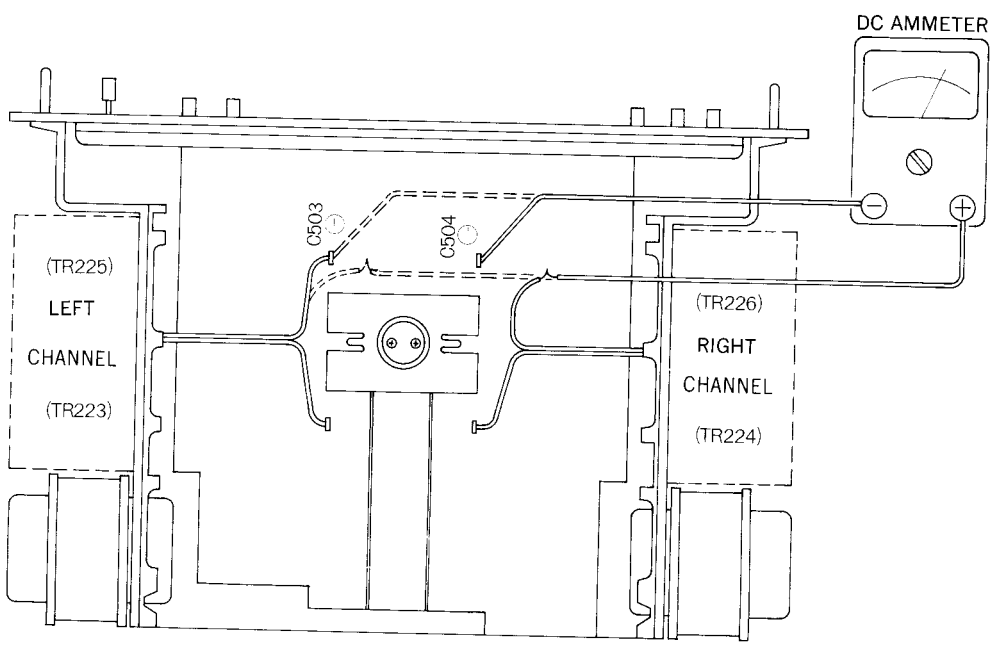


Fig. 2 (Abb. 2)

■ VOR DEM BEGINN DER REPARATUR

- Vor dem Reparieren dieses Gerätes sind den folgenden Punkten besondere Aufmerksamkeit zu widmen.
  Da 4 Kondensatoren von großer Kapzität bei 18.000μF als Stromquelle verwendet werden, bleibt die Ladespannung lange Zeit nach Ausschalten der Stromquelle noch bestehen, und stellt somit eine Gefahrenquelle eines elektrischen Schlages dar, falls die (+) und (−) Hauptleitung mit den Händen berührt werden. Beachten Sie daher, daß vor jeder Reparatur die entgegengesetzten Pole der 18.000μF Kondensatoren (C501~C504) mit einem Resistor von ungefähr "15 Ω 10 W" zum Entladen der Ladespannung kurzgeschlossen werden müssen. Kurzschließen mit einem Schraubenzieher ist nicht nur gefährlich, sondern könnte auch Dioden und Transistoren beschädigen, und sollte daher vermieden werden.

■ ABGLEICHANWEISUNGEN

- **Diagramm für die abzustimmenden Teile (Abb. 1)**
- **Bedingung des Gerätes**

1. Lautstärkeregler auf "Minimum"
2. Betriebsart-Wahlschalter auf "DC"
3. Stereo. Mono-(Betriebsart)-Wahlschalter auf "Stereo"
4. Haupt-& Nebenlautsprechet-Schalter auf "ON" (gedrückt).

Anschluß eines Gleichstrom Voltmeters	Abzustimmende Teile	Abstimmungs-vorgang
1. JUSTIERUNG DER POSITIVEN SPANNUNG (+B STROMVERSORGUNG)		
Zwischen TP1 (+ Seite) und TP3 (−Seite) anschließen.	VR401	• Auf (+) 55V abstimmen • Sicherstellen, daß die Spannung zwischen TP2 and TP3 (−) 55V beträgt.
2. ABSTIMMEN DER LAUTSPRECHERANSCHLU-WECHSELSTROMBALANCE		
Verbindungen zu den Anschlüssen den linken und rechten Lautsprecherkanals machen.	VR101 (linker Kanal) VR102 (rechter Kanal)	Auf 0mV abstimmen, mit geringstmöglichem Bereich.
3. ABSTIMMEN DES ICQ		
(linker-K) .... Zwischen den Stellen TP4 und TP5 anschließen (rechter-K) ... Zwischen den Stellen TP6 und TP7 anschließen	VR201 (linker-Kanal) VR202 (rechter-Kanal)	• Die Abstimmungen mindestens 5 Min. nach Einschalten des Netzschalter vornehmen. • Auf 20mV abstimmen.

Falls die ICQ-Abstimmung durch Abstimmen des Stromes mittels des Prüfgerätes vorgenommen wird. (In diesem Falle ist der Gleichstrom-Voltmeter nicht erforderlich.)

Anmerkung:
1. Beim Benutzen des Prüfgerätes muß der Netzschalter zum Entladen der vorhandenes Spannung ausgeschaltet werden, wie im Abschnitt "Vor dem Beginn der Reparatur". (Vor dem Beginn der Reparatur).
2. Anschließen das Prüfgerät so anschließen, daß sich die Kontakte nicht lösen können.
3. Nach dem Abstimmen sollten die Zuleitungen gleich, wie vorher gelötet werden, aber erst, nachdem der Netzschalter ausgeschaltet worden ist.
4. Die Abstimmungen sollten etwa 5 Minuten nach dem Einschalten des Netzschalters durchgeführt werden.

(Linker Kanal)

1) Die Grundplatte des Gerätes abnehmen.
2) Den Leitungsdraht von der (−) Seite des elektrolytischen Kondensators (C503) der Stromversorgung entfernen. Den (−)-Anschluß eines Ammeters an den (−)-Anschluß des elektrolytischen Kondensators (C503) anschließen, und den (+)-Anschluß des Ammeters an den Leitungsdraht anschließen (Vgl. Abb 2).
3) **VR 201** so abstimmen, bis er 25~ 30mA erreicht. (Dies kann zu einem gewissen Grad differieren, je nach den internen Impedanzen des Prüfgerätes.)

(Rechter Kanal)

1) Die Grundplatte des Gerätes abnehmen.
2) Den Leitungsdraht von der (−) Seite des elektrolytischen Kondensators (C504) der Stromversorgung entfernen. Den (−)-Anschluß eines Ammeters an den (−)-Anschluß des elektrolytischen Kondensators (C504) anschließen, und den (+)-Anschluß des Ammeters an den Leitungsdraht anschließen (Vgl. Abb 2).
3) **VR202** so abstimmen bis er 25~ 30mA erreicht. (Dies kann zu einem gewissen Grad differieren, je nach den internen Impedanzen des Prüfgerätes.)

■ AVANT DE COMMENCER UNE RÉPARATION

- Pour réparer cet appareil, soyez particulièrement attentif au sujet des points suivants.
  Etant donné que 4 condensateurs d'une puissance élevée de 18.000μF sont employés pour la source d'énergie, la tension de charge reste encore pendant une assez longue période, une fois que l'alimentation est mise en marche, avec le danger de secousses électriques si le circuit de tension d'alimentation (+) et (—) est touché avec les mains. Par conséquent, avant de procéder à une réparation, s'assurer de court-circuiter les pôles opposés des condensateurs à 18.000μF (C501~C504) avec une résistance d'approximativement de "15Ω10W", pour le déchargement de la tension de charge. Le court-circuitage avec un tournevis ou tout autre instrument similaire n'est pas dangereux, mais risque de détruire les transistors et les diodes et devra, par conséquent, être évité.

■ INSTRUCTIONS D'ALIGNEMENT ET DE REGLAGE

- **Diagramme des sections devant être réglées (Fig. 1)**
- **Conditions de l'ensemble**

1. Réglage du volume sur "Minimum".
2. Commutateur de commande sur "DC" (C.C.).
3. Commutateur (commande) sélecteur stéréo-monophonique sur "stereo".
4. Commutateur des haut-parleurs principal et auxiliaires sur "ON (push)", (Marche (poussée)).

Branchement du voltétre à C.C.	Sections à régler	Mode de mise au point
1. MISE AU POINT DE LA TENSION POSITIVE (ALIMENTATION +B)		
Pour être branché entre les bornes TP1 (côté +) et TP3 (côte —).	VR401	• Doit être réglé à (+) 55V. • Vérifier pour s'assurer que la tension entre TP2 et TP3 est de (—) 55V.
2. MISE AU POINT DE L'ÉQUILIBRAGE C.C. DES BORNES DU HAUT-PARLEUR		
Faire les branchements aux bornes des hautparleurs des canaux gauches et droits.	VR101 (canal gauche) VR102 (canal droit)	Régler sur 0 mV, sur une bande aussi petite que possible.
3. MISE AU POINT DE I_{CQ} (TEMPS MORT DU TRANSISTOR DE PUISSANCE)		
(Canal gauche) . Brancher entre les bornes TP4 (+) et TP5 (—) (Canal droit) . . . Brancher entre les bornes TP6 (+) et TP7 (—)	VR201 (canal gauche) VR202 (canal droit)	• Faire la mise au point plus de 5 minutes après la mise en marche ("ON") de l'alimentation.

Dans le cas où la mise au point de I_{CQ} est faite à travers un réglage de courant par le dispositif d'essai. (Dnas ce cas, un voltmètre C.C. n'est pas nécessaire).

Nota:
1. Pour utiliser le dispositif d'essai, s'assurer de couper l'alimentaion ("OFF") pour le déchargement de la tension chargée, comme dans le paragraphe "Avant de commencer une réparation". (Avaut de commencer une réparation).
2. Par la suite, brancher parfaitement le dispositif d'essai, de façon qu'il ne risque pas de se dégager.
3. Après la mise au point, les fils de jonction devront être aussi parfaitement soudés que dans la condition originale, mais ceci seulement après avoir coupé l'alimentation.
4. Les réglages devront être faits à peu prés 5 minutes après avoir coupé l'alimentation.

(Dans le cas du canal gauche)

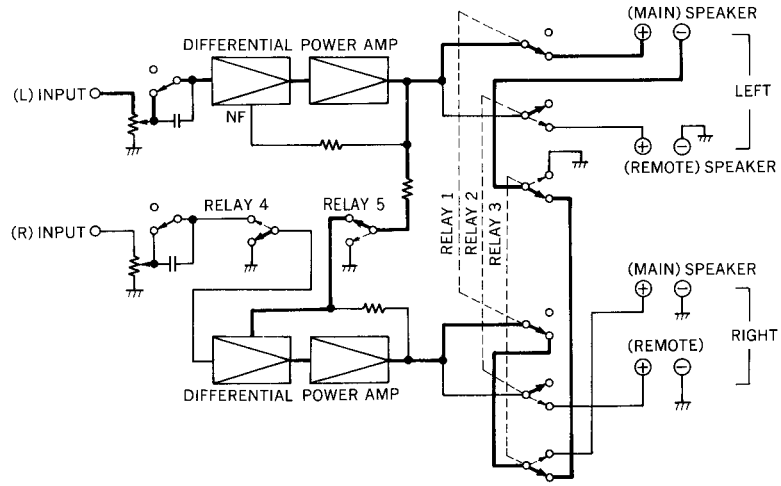
1. Retirer le support inférieur de l'appareil.
2. Enlever le fil de jonction du côté (—) du condensateur (C503) électrolytique d'alimentation, brancher la borne (—) de l'ampèremètre (contrôleur de circuit) à la borne (—) du condensateur (C503) électrolytique et brancher la borne (+) de l'ampèremètre (contrôleur de circuit) au fil de jonction.
   (Se référer à la Fig. 2).
3. Régler **VR201** de façon à atteindre 25 ~ 30mA (cela pouvant différer jusqu'à une certaine importance, selon les impédances internes du dispositif d'essai).

(Dans le cas du canal droit)

1. Retirer le support inférieur de l'appareil.
2. Enlever le fil de jonction du côté (—) du condensateur (C504) électrolytique d'alimentation, brancher la borne (—) de l'ampèremètre (contrôleur de circuit) à la borne (—) du condensateur (C504) électrolytique et brancher la borne (+) de l'ampèremètre (contrôleur de circuit) au fil de jonction.
   (Se référer à la Fig. 2).
3. Régler **VR202** de façon à atteindre 25 ~ 30mA (cela pouvant différer jusqu'à une certaine importance, selon les impédances internes du dispositif d'essai).

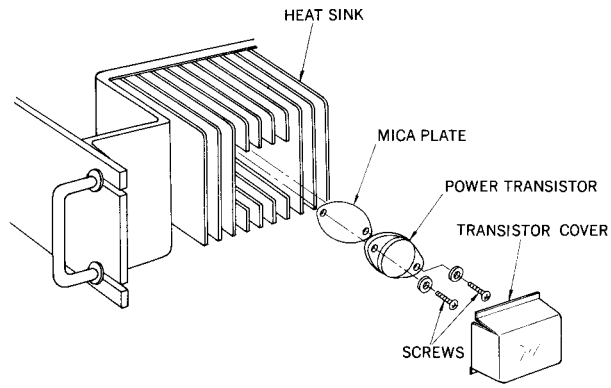
■ BLOCK DIAGRAM OF BTL OPERATION

When the operation switch on the rear panel of this unit is moved from the "STEREO" to the "MONO (BTL)" position, relay 2 becomes off and the remote speakers will be disconnected. Relays 3, 4 and 5 will then operate, connected as shown in the figure.



■ TO REMOVE THE POWER TRANSISTORS

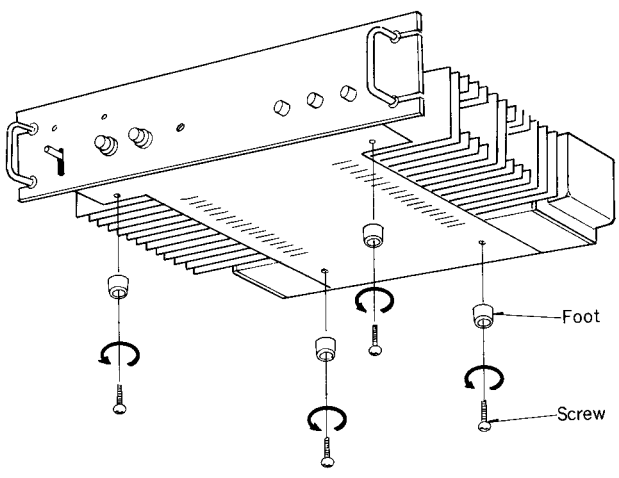
1. The power transistor cover is fitted into the groove of the heat sink. Insert an instrument, such as a minus-tip screwdriver, from the fins of the heat sink and between the groove and the cover, using it to pry the cover open.
2. Remove the screws holding the power transistors.
3. Use radio pliers to pull the power transistors out of the transistor sockets of the heat sink.
4. When power transistors are newly installed, coat both sides of the mica plate with silicon compound (or a similar heat-radiation material).

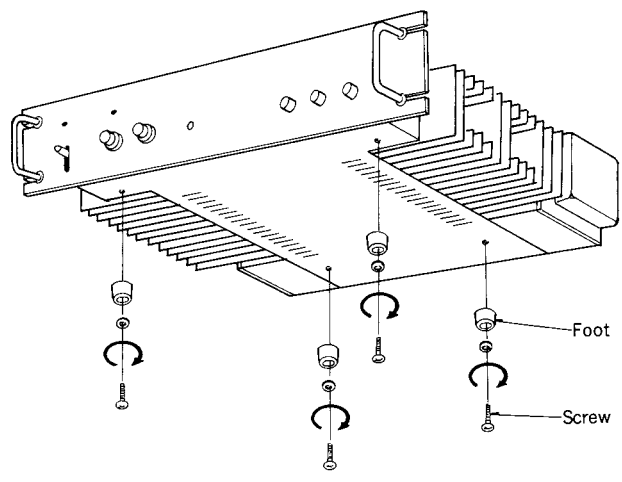


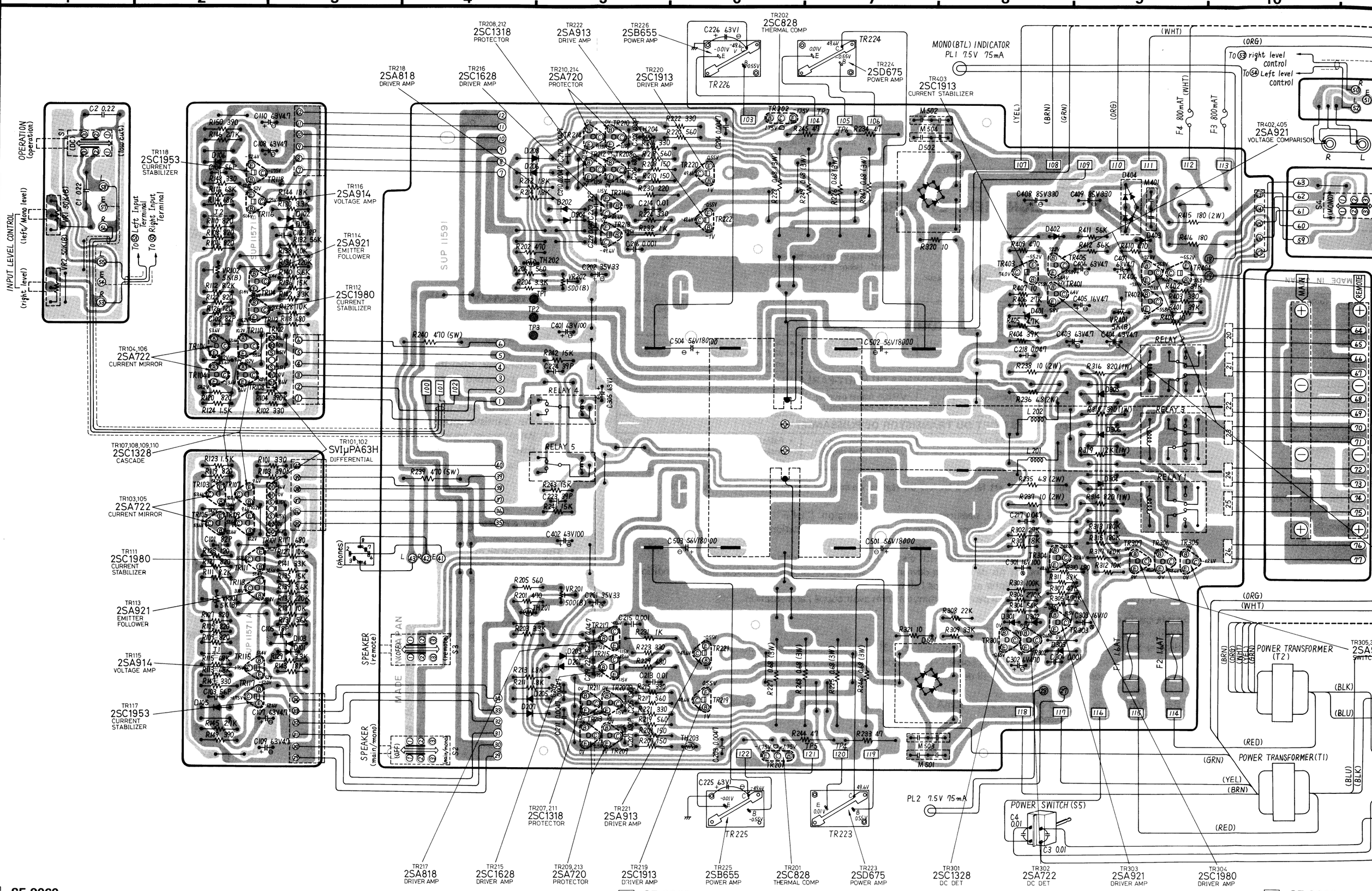
■ ATTACHMENT OF FEET (INCLUDED)

This unit has an extra set of 4 feet which, if installed, lower the height by 8mm, to 84mm.
These feet are especially useful if other audio components in this series (models SU-9070, SH-9010, ST-9030 and SH-9020) are stacked one on top of another.

- Attachment
  ① Remove the feet already attached to the bottom of unit.
  ② Attach the other set of feet (included) by using the screws (also included). Use the same holes as for the original feet.





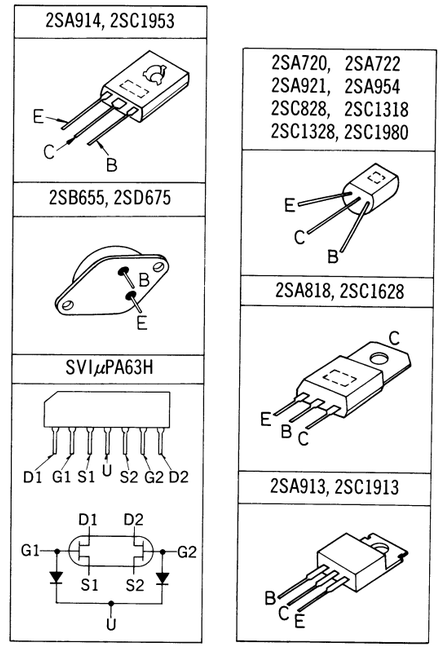


8 SE-9060 9 SE-9060 10 SE-9060

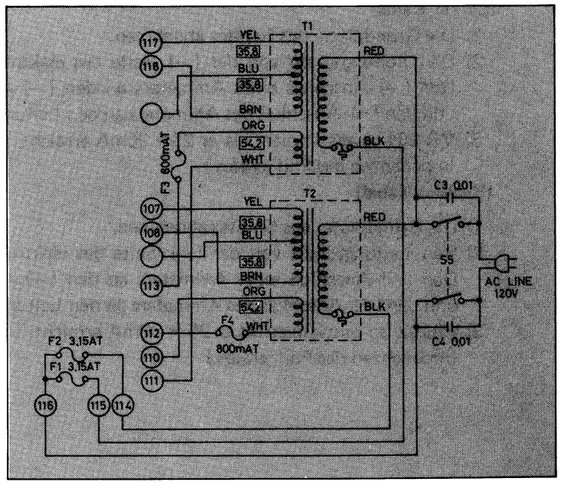
Printed Circuit Board

EARTH CIRCUITS

■ TERMINAL GUIDES



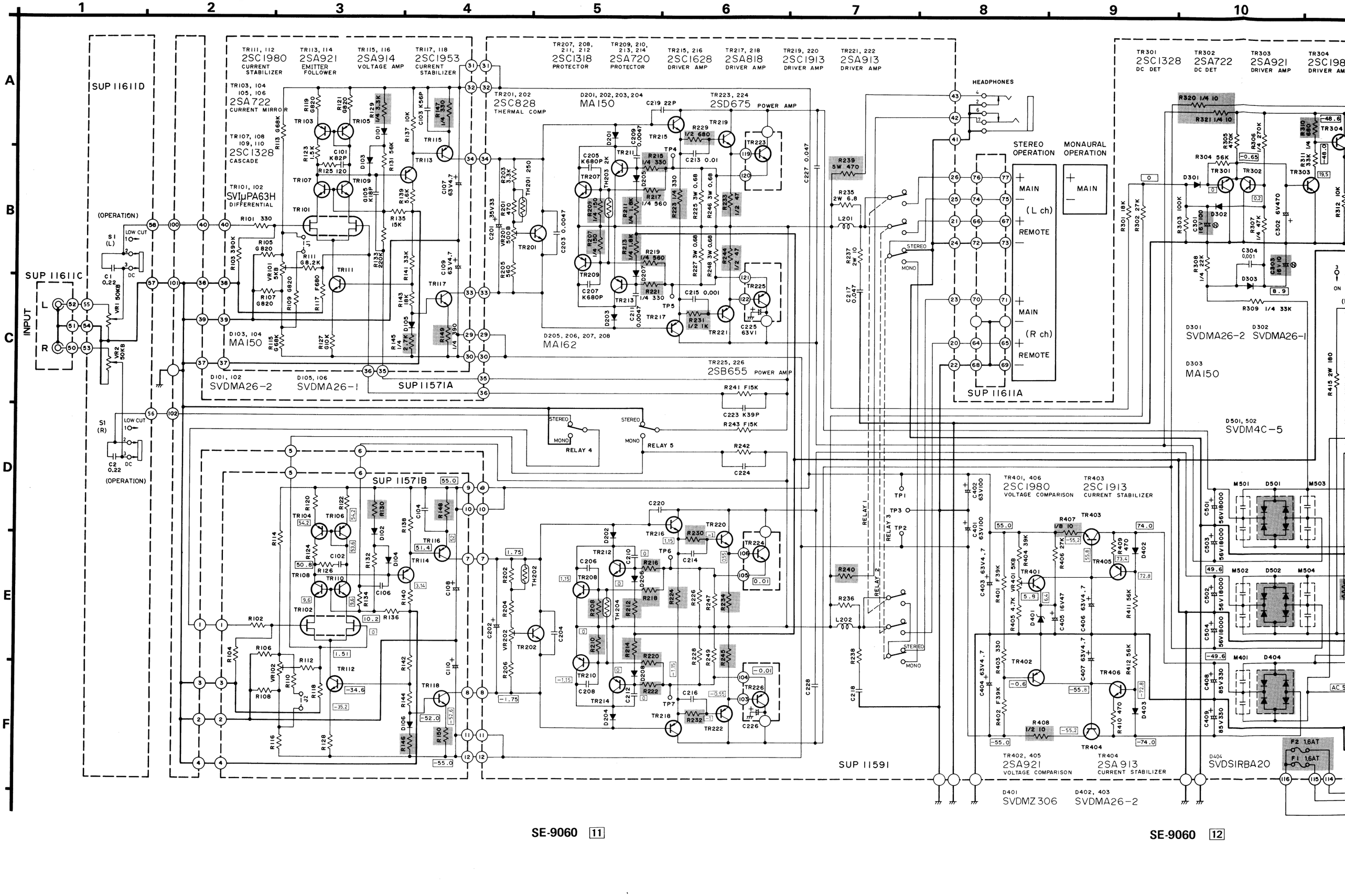
Power souree...Only set for Panama and Mexico[XM]



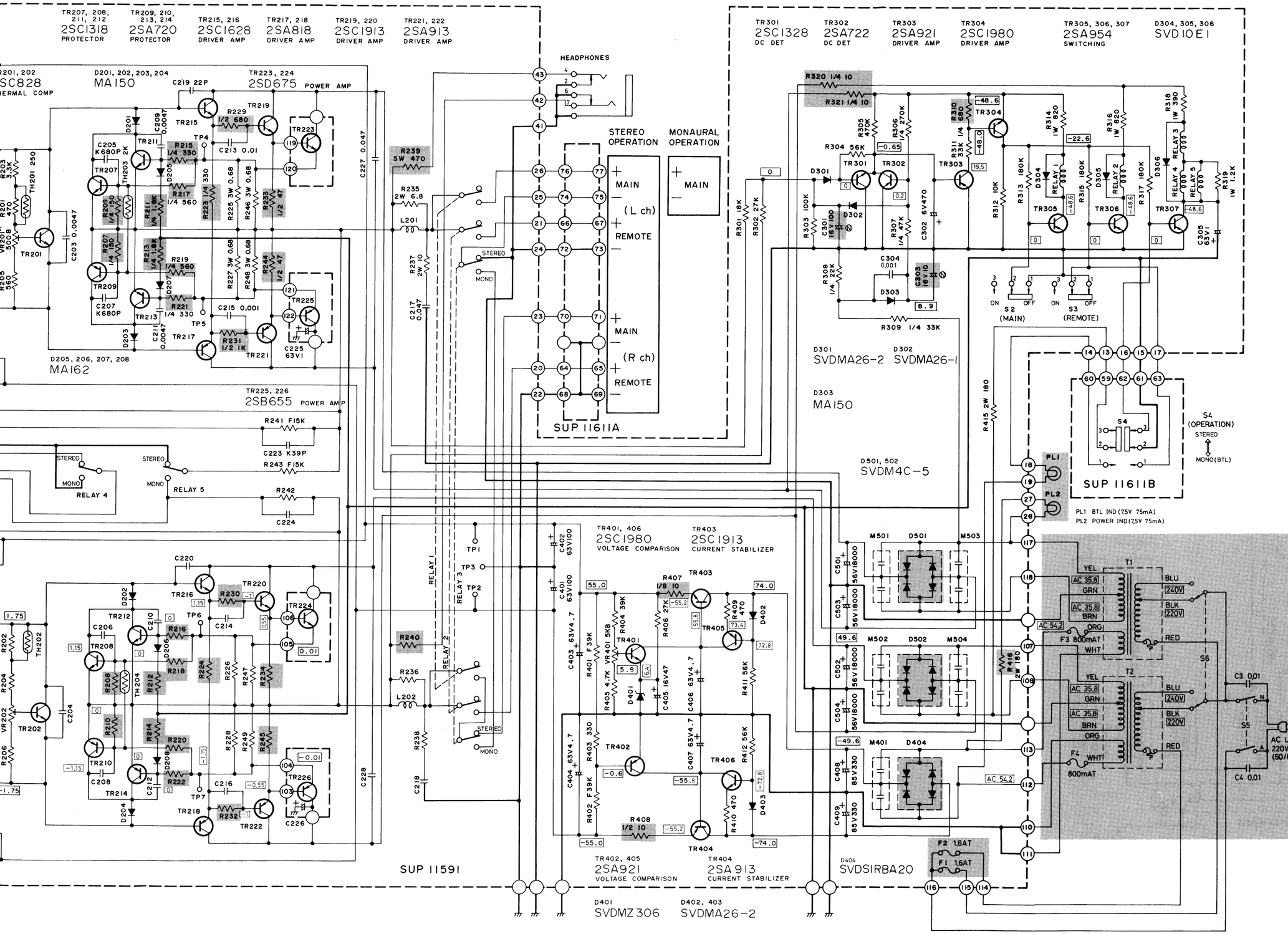
9 SE-9060

10 SE-9060

Schematic Diagram ... Model SE-9060



5 6 7 8 9 10 11 12



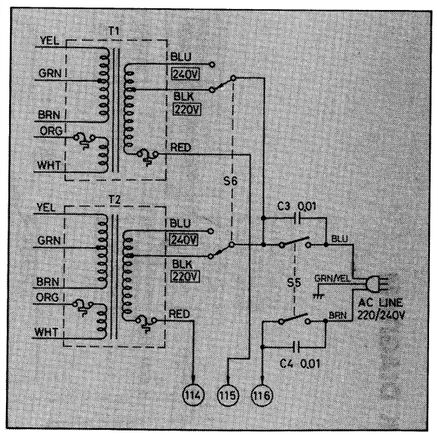
Notes:

1. **S1:** Operation switch in "**DC**" position. [DC⟷low cut (2Hz)]
2. **S2:** Main/mono speaker switch in "**off**" position. [off⟷on]
3. **S3:** Remote speaker switch in "**off**" position. [off⟷on]
4. **S4:** Operation (mode) switch in "**stereo**" position. [stereo⟷mono (BTL)]
5. **S5:** Power source switch in "**off**" position.
6. **S6:** Voltage selector switch in "**220V**" position.
7. ▭ Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high impedance) with the chassis taken as standard.
   Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
8. The left and right channels use the same type of circuitly. The resistors capacitors, etc. used for the right channel (circuit diagram below) are the same as for the left channel.
9. This schematic diagram may be modified at any time with the development of new technology.

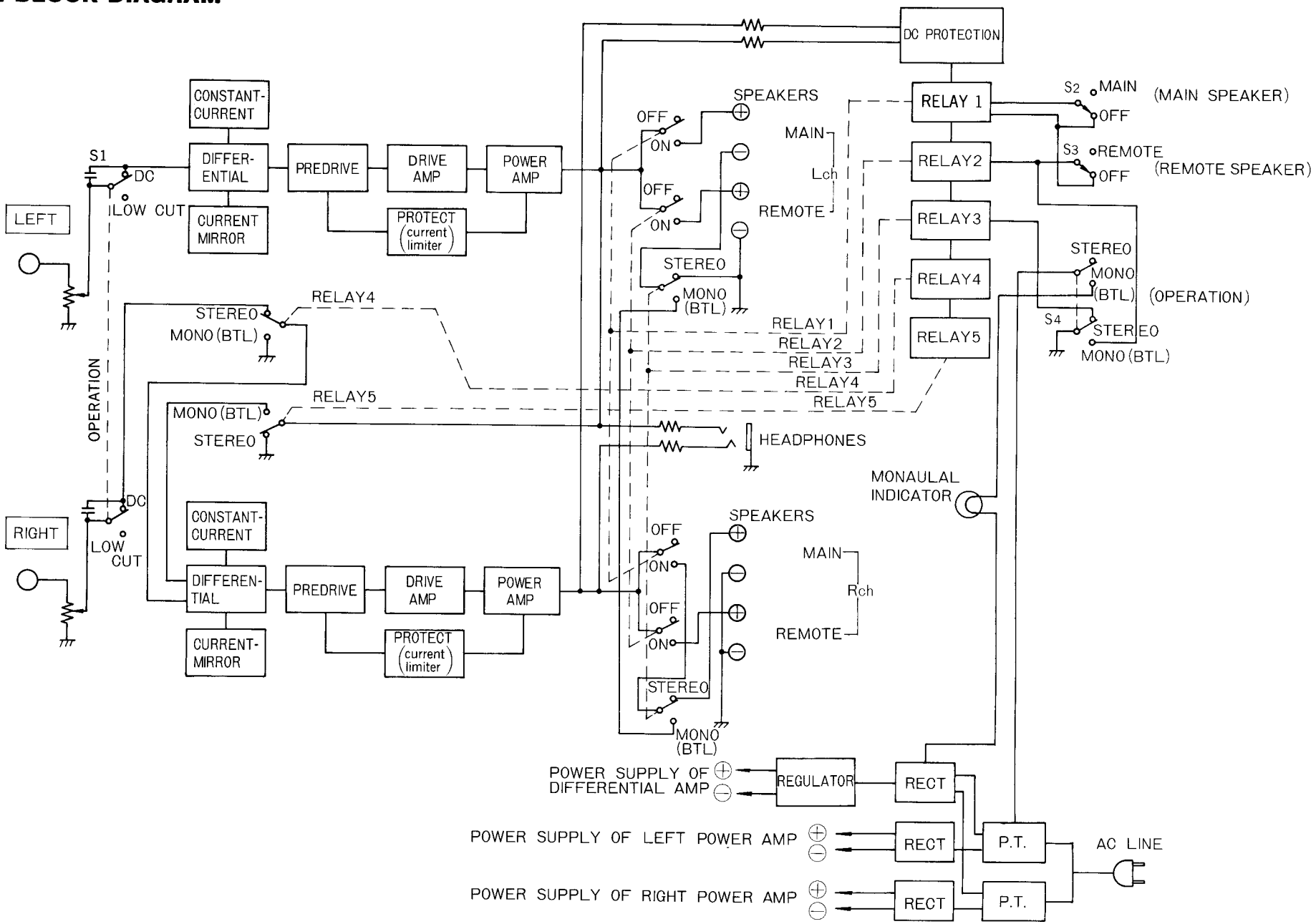
IMPORTANT SAFETY NOTICE

THE SHADED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR SAFETY. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTUR'S SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SHADED AREAS OF THE SCHEMATIC.

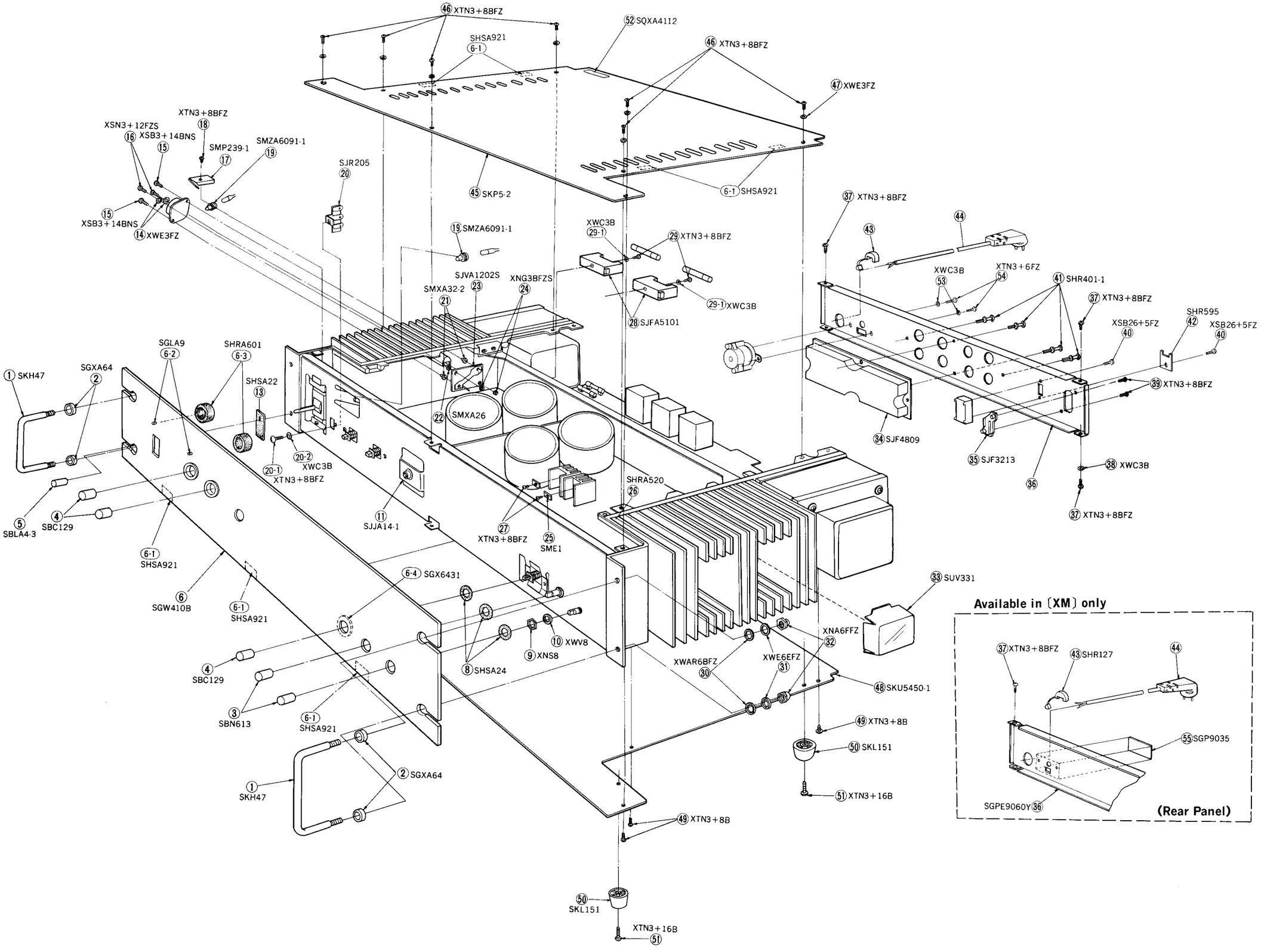
Power source.....Only set for England [XE]



■ BLOCK DIAGRAM



■ EXPLODED VIEWS



SE-9060 15 16 SE-9060

■ REPLACEMENT PARTS LIST

Important Safety Notice

Components identified by shaded area have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

NOTE: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
		TRANSISTORS		
TR101, 102	SVIUPA63H1	Transistor, Differential	2	O
TR103, 104, 105 106	**2SA902S-F**	Transistor, Current Mirror (Use in ranks F or G)	4	
TR107, 108, 109 110	**2SC1328-T**	Transistor, Cascade (Use in ranks S, T or U)	4	
TR111, 112	2SC1980-S	Transistor, Current Stabilizer (Use in ranks R, S or T)	2	O
TR113, 114	2SA921-T	Transistor, Emitter Follower (Use in ranks S, T or U)	2	O
TR115, 116	2SA914-R	Transistor, Current Stabilizer (Use in ranks Q or R)	2	O
TR117, 118	2SC1953-R	Transistor, Current Stabilizer (Use in ranks Q or R)	2	O
TR201, 202	**2SC1328-T**	Transistor, Thermal Compensator (Use in ranks S, T or U)	2	
TR207, 208, 211 212	**2SC1318-R**	Transistor, Protector (Use in ranks Q or R)	4	
TR209, 210, 213 214	**2SA720-R**	Transistor, Protector (Use in ranks Q or R)	4	
TR215, 216	2SC1628-0	Transistor, Driver Amp. (Use in ranks O or Y)	2	
TR217, 218	2SA818-0	Transistor, Driver Amp. (Use in ranks O or Y)	2	
TR219, 220, 403	2SC1913-R	Transistor, Driver Amp. (Use in ranks Q, R or S)	3	
TR221, 222, 404	2SA913-R	Transistor, Driver Amp. (Use in ranks Q, R or S)	3	
TR223, 224	2SD675-C	Transistor, Power Amp. (Use in ranks B or C)	2	O
TR225, 226	2SB655-C	Transistor, Power Amp. (Use in ranks B or C)	2	O
TR301	**2SC1328-T**	Transistor, DC Det. (Use in ranks S, T or U)	1	
TR302	**2SA902S-F**	Transistor, DC Det. (Use in ranks F or G)	1	
TR303, 402, 405	2SA921-T	Transistor, Driver Amplifier & Voltage Comparison (Use in ranks R, S or T)	3	O
TR304, 401, 406	2SC1980-T	Transistor, Driver Amplifier & Voltage Comparison (Use in ranks R, S or T)	3	O
TR305, 306, 307	2SA954-L	Transistor, Switching (Use in ranks L or M)	3	
		DIODES		
D101, 102	SVDMA26-2	Diode	2	
D103, 104	MA150	Diode	2	
D105, 106	SVDMA26-1	Diode	2	
D201, 202, 203 204, 303	MA150	Diode	5	
D205, 206, 207 208	MA162	Diode	4	
D301, 402, 403	SVDMA26-2	Diode	3	
D302	SVDMA26-1	Diode	1	
D304, 305, 306	SVD10E1	Diode, Relay Coil	3	
D401	SVDMZ306	Zener Diode, 6V	1	
D404	SVDS1R8A20	Rectifier	1	
D501, 502	SVDM4C-5	Rectifier	2	O

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
		COILS and TRANSFORMERS		
L201, 202	SLQY15G-3U	Coil, Compensation	2	
T1, 2	SLT5P107-W	Power Transformer (Except set for [XE & XM])	2	O
T1, 2 [XE] only	SLT5P129-W	Power Transformer	2	O
T1, 2 [XM] only	SLT5P105-W	Power Transformer	2	O
		RESISTORS		
R101, 102	**ERD25TJ331**	Carbon, 330Ω, 1/4W, ±5%,	2	
R103, 104	**ERD25TJ394**	Carbon, 390kΩ, 1/4W, ±5%,	2	
R105, 106	ERO25CKG8200	Metallic, 820Ω, 1/4W, ±2%	2	O
R107, 108	ERO25CKG8200	Metallic, 820Ω, 1/4W, ±2%	2	O
R109, 110	ERO25CKG8200	Metallic, 820Ω, 1/4W, ±2%	2	O
R111, 112	ERO25CKG8201	Metallic, 8.2kΩ, 1/4W, ±2%	2	O
R113, 114	ERO25CKG6802	Metallic, 68kΩ, 1/4W, ±2%	2	O
R115, 116	ERO25CKG6802	Metallic, 68kΩ, 1/4W, ±2%	2	O
R117, 118	ERO25CKF6800	Metallic, 680Ω, 1/4W, ±1%	2	O
R119, 120	ERO25CKG8200	Metallic, 820Ω, 1/4W, ±2%	2	O
R121, 122	ERO25CKG8200	Metallic, 820Ω, 1/4W, ±2%	2	O
R123, 124	**ERD25TJ152**	Carbon, 1.5kΩ, 1/4W, ±5%	2	
R125, 126	**ERD25TJ121**	Carbon, 120Ω, 1/4W, ±5%	2	
R127, 128	ERO25CKG1002	Metallic, 10kΩ, 1/4W, ±2%	2	O
R129, 130	**ERD14FJ332**	Carbon, 3.3kΩ, 1/4W, ±5%	2	
R131, 132	**ERD25TJ563**	Carbon, 56kΩ, 1/4W, ±5%	2	
R133, 134	**ERD25TJ224**	Carbon, 220kΩ, 1/4W, ±5%	2	
R135, 136	**ERD25TJ153**	Carbon, 15kΩ, 1/4W, ±5%	2	
R137, 138	**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ±5%	2	
R139, 140	**ERD25TJ562**	Carbon 5.6kΩ, 1/4W, ±5%	2	
R141, 142	**ERD25TJ333**	Carbon, 33kΩ, 1/4W, ±5%	2	
R143, 144	**ERD25TJ183**	Carbon, 18kΩ, 1/4W, ±5%	2	
R145, 146	**ERD14FJ272**	Carbon, 2.7kΩ, 1/4W, ±5%	2	
R147, 148	**ERD14FJ331**	Carbon, 330Ω, 1/4W, ±5%	2	
R149, 150	**ERD14FJ391**	Carbon, 390Ω, 1/4W, ±5%	2	
R201, 202	**ERD25TJ471**	Carbon, 470Ω, 1/4W, ±5%	2	
R203, 204	**ERD25TJ332**	Carbon, 3.3kΩ, 1/4W, ±5%	2	
R205, 206	**ERD25TJ561**	Carbon, 560Ω, 1/4W, ±5%	2	
R207, 208	**ERD14FJ151**	Carbon, 150Ω, 1/4W, ±5%	2	
R209, 210	**ERD14FJ151**	Carbon, 150Ω, 1/4W, ±5%	2	
R211, 212	**ERD14FJ182**	Carbon, 1.8kΩ, 1/4W, ±5%	2	
R213, 214	**ERD14FJ182**	Carbon, 1.8kΩ, 1/4W, ±5%	2	
R215, 216	**ERD14FJ331**	Carbon, 330Ω, 1/4W, ±5%	2	
R217, 218	**ERD14FJ561**	Carbon, 560Ω, 1/4W, ±5%	2	
R219, 220	**ERD14FJ561**	Carbon, 560Ω, 1/4W, ±5%	2	
R221, 222	**ERD14FJ331**	Carbon, 330Ω, 1/4W, ±5%	2	
R223, 224	**ERD14FJ331**	Carbon, 330Ω, 1/4W, ±5%	2	
R225, 226	**ERX3ANJR68**	Metal Film, 0.68Ω, 3W, ±5%	2	
R227, 228	**ERX3ANJR68**	Metal Film, 0.68Ω, 3W, ±5%	2	
R229, 230	ERQ12HJ681	Fuse Type Metallic, 680Ω, 1/2W, ±5%	2	O
R231, 232	ERQ12HJ102	Fuse Type Metallic, 1kΩ, 1/2W, ±5%	2	O
R233, 234	ERQ12HJ470	Fuse Type Metallic, 47Ω, 1/2W, ±5%	2	O
R235, 236	**ERX2ANJ6R8**	Metal Film, 6.8Ω, 2W, ±5%	2	
R237, 238	**ERG2ANJ100**	Metal Film, 10Ω, 2W, ±5%	2	
R239, 240	**ERF5SJ471**	Non Flammable, 470Ω, 5W, ±5%	2	
R241, 242, 243	ERO25CKF1502	Metallic, 15kΩ, 1/4W, ±1%	3	
R244, 245	ERQ12HJ470	Fuse Type Metallic, 47Ω, 1/2W, ±5%	2	
R246, 247	**ERX3ANJR68**	Metal Film, 0.68Ω, 3W, ±5%	2	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
R248, 249	**ERX3ANJR68**	Metal Film, 0.68Ω, 3W, ±5%	2	
R301	**ERD25TJ183**	Carbon, 18kΩ, 1/4W, ±5%	1	
R302	**ERD25TJ273**	Carbon, 27kΩ, 1/4W, ±5%	1	
R303	**ERD25TJ104**	Carbon, 100kΩ, 1/4W, ±5%	1	
R304	**ERD25TJ563**	Carbon, 56kΩ, 1/4W, ±5%	1	
R305	**ERD25TJ474**	Carbon, 470kΩ, 1/4W, ±5%	1	
R306	ERO25CKF2703	Metallic, 270kΩ, 1/4W, ±1%	1	○
R307	ERO25CKG4702	Metallic, 47kΩ, 1/4W, ±2%	1	
R308	ERO25CKF2202	Metallic, 22kΩ, 1/4W, ±1%	1	
R309	ERO25CKF3302	Metallic, 33kΩ, 1/4W, ±1%	1	
R310	**ERD14FJ681**	Carbon, 680Ω, 1/4W, ±5%	1	
R311	**ERD25TJ333**	Carbon, 33kΩ, 1/4W, ±5%	1	
R312	**ERD25TJ103**	Carbon, 10kΩ, 1/4W, ±5%	1	
R313	**ERD25TJ184**	Carbon, 180kΩ, 1/4W, ±5%	1	
R314	**ERG1ANJ821**	Metal Film, 820Ω, 1W, ±5%	1	
R315	**ERD25TJ184**	Carbon, 180kΩ, 1/4W, ±5%	1	
R316	**ERG1ANJ821**	Metal Film, 820Ω, 1W, ±5%	1	
R317	**ERD25TJ184**	Carbon, 180kΩ, 1/4W, ±5%	1	
R318	**ERG1ANJ391**	Metal Film, 390Ω, 1W, ±5%	1	
R319	**ERG1ANJ122**	Metal Film 1.2kΩ, 1W, ±5%	1	
R320, 321	**ERD14FJ100**	Carbon, 10Ω, 1/4W, ±5%	2	
R401, 402	ERO25CKF3902	Metallic, 39kΩ, 1/4W, ±1%	2	○
R403	**ERD25TJ331**	Carbon, 330Ω, 1/4W, ±5%	1	
R404	**ERD25TJ393**	Carbon, 39kΩ, 1/4W, ±5%	1	
R405	**ERD25TJ472**	Carbon, 4.7kΩ, 1/4W, ±5%	1	
R406	**ERD25TJ273**	Carbon, 27kΩ, 1/4W, ±5%	1	
R407	ERD18FJ100	Carbon, 10Ω, 1/6W, ±5%	1	
R408	ERQ12HJ100	Fuse Type Metallic, 10Ω, 1/2W, ±5%	1	
R409,410	**ERD25TJ471**	Carbon, 470Ω, 1/4W, ±5%	2	
R411, 412	**ERD25TJ563**	Carbon, 56kΩ, 1/4W, ±5%	2	
R415, 416	**ERG2ANJ181**	Metal Film, 180Ω, 2W, ±5%	2	
VARIABLE RESISTORS				
VR1, 2	EVHCVA058B54	Left/Mono & Right Level Control, 50kΩ (B)	2	○
VR101, 102	EVM1A00B53S	DC Balance Adjustment, 5kΩ (B)	2	○
VR201, 202	EVTR4AA00B52	Iω Adjustment, 500Ω (B)	2	○
VR401	EVTR4AA00B53	Voltage Control Adjustment, 5kΩ (B)	1	○
CAPACITORS				
C1, 2	ECQM1H224KZ	Polyester, 0.22μF, 50V, ±10%	2	
C3, 4	ECNC4A103M	Paper, 0.01μF, 450V AC, ±20%	2	
C101, 102	ECCD1H820K	Cermaic, 82pF, 50V, ±10%	2	
C103, 104	ECCD1H560K	Ceramic, 56pF 50V, ±10%	2	
C105, 106	ECCD2H180K	Ceramic, 18pF, 500V, ±10%	2	
C107, 108	ECEA63V4R7	Electrolytic, 4.7μF, 63V	2	
C109, 110	ECEA63V4R7	Electrolytic, 4.7μF 63V	2	
C201, 202	**ECEA35V33V**	Electrolytic, 33μF, 35V	2	
C203, 204	ECKD1H472ZF	Ceramic, 0.0047μF, 50V, +80% −20%	2	
C205, 206	ECKD1H681KB	Ceramic, 680pF, 50V, ±10%	2	
C207, 208	ECKD1H681KB	Ceramic, 680pF, 50V, ±10%	2	
C209, 210	ECKD1H472ZF	Ceramic, 0.0047μF, 50V, +80% −20%	2	
C211, 212	ECKD1H472ZF	Ceramic, 0.0047μF, 50V, +80% −20%	2	
C213, 214	ECKD1H103ZF	Ceramic, 0.01μF, 50V, +80% −20%	2	
C215, 216	ECKD1H102ZF	Ceramic, 0.001μF, 50V, +80% −20%	2	
C217, 218	ECQM1473KZ	Polyester, 0.047μF, 100V, ±10%	2	

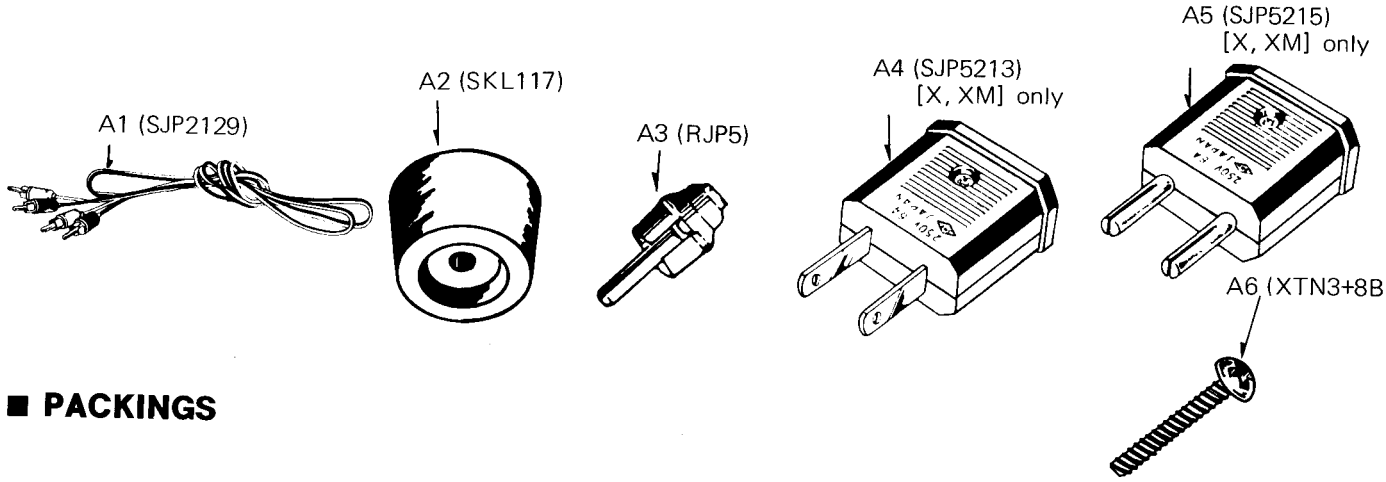
Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
C219, 220	ECCD2H220K	Ceramic, 22pF, 500V, ±10%	2	
C223, 224	ECCD1H390K	Ceramic, 39pF, 50V, ±10%	2	
C225, 226	ECEA63V1	Electrolytic, 1μF, 63V	2	
C227, 228	ECQM1473KZ	Polyester, 0.047μF, 100V, ±10%	2	
C301	**ECEA16N100V**	Non-Polar Electrolytic, 100μF, 16V	1	
C302	ECEA6A470	Electrolytic, 470μF, 6.3V	1	○
C303	**ECEA16N10**	Non-Polar Electrolytic, 10μF, 16V	1	○
C304	ECKD1H102ZF	Ceramic, 0.001μF, 50V, +80% −20%	1	
C305	ECEA63V1	Electrolytic, 1μF, 63V	1	○
C401, 402	ECEA63A100	Electrolytic, 100μF, 63V	2	○
C403, 404	ECEA63V4R7	Electrolytic, 4.7μF, 63V	2	
C405	ECEA16V47	Electrolytic, 47μF, 16V	1	
C406, 407	ECEA63V4R7	Electrolytic, 4.7μF, 63V	2	
C408, 409	ECEA85A330	Electrolytic, 330μF, 85V	2	○
C501, 502	ECEM56R183Z	Electrolytic, 18000μF, 56V	2	○
C503, 504	ECEM56R183Z	Electrolytic, 18000μF, 56V	2	○
LAMPS				
PL1, 2	**XAMR28K500**	Power Indicator (7.5V, 75mA)	2	
FUSES				
F1, 2	XBA2C16TR0	Fuse, 1.6AT [250V], Power Source (Except set for [XM])	2	
F1, 2 [XM] only	XBA2C31TR0	Fuse, 3.15AT [250V], Power Source	2	
F3, 4	XBA2C08TR0	Fuse, 800mAT [250V], Power Source	2	
SWITCHES				
S1	SSH79S	Switch, Operation DC & Low Cut	1	○
S2, 3	SSH243S	Switch, Main/Mono & Remote Speakers	1	○
S4	SSS43	Switch, Operation Stereo & Mono (BTL)	1	○
S5	SSL11S	Switch, Power Source	1	
S6	SSR87S	Switch, Voltage Selector	1	○
RELAYS				
RELAY1, 2	SSY19-1	Relay, Speakers Protection	2	○
RELAY 3	SSY35	Relay, Balanced Transformer Less (BTL)	1	
RELAY 4, 5	SSY33	Relay, Balanced Transformer Less (BTL) & Muting	2	○
COMPONENT COMBINATIONS				
M401, 501, 502 503, 504	RXAF103P22HD	Component Combination, 0.01μF (X2)	5	
THERMISTORS				
TH201, 202	RRT251	Thermistor, Driver Circuit	2	
TH203, 204	ERTD2FHK202S	Thermistor, Current Limiter Circuit	2	
CABINET and CHASSIS PARTS				
1	SKH47	Handle, Front Panel	2	
2	SGXA64	Sleeve, Handle	4	
3	SBN613	Knob, Left/Mono & Right Level Volume	2	
4	SBC129	Button, Speaker & Operation Switch	3	

Ref. No.	Part No.	Part Name & Description	Per Set	Remarks
5	SBLA4-3	Knob, Power Switch	1	
6	SGW410B	Panel, Front	1	○
6-1	SHSA921	Shading Cloth, Front Panel	7	
6-2	SGLA9	Panel Light, Orange	2	
6-3	SHRA601	Bracket, Lamps	2	
6-4	SGX6431	Bushing, Operation Switch	1	
8	SHSA24	Shading Cloth	3	
9	XNS8	Nut, Left/Mono & Right Level Volume	2	
10	XWV8	Washer, Left/Mono & Right Level Volume	2	
11	SJJA14-1	Jack, Headphones	1	
13	SHSA22	Shading Cloth, Power Switch	1	
14	XWE3FZ	Washer, Power Transistor M'tg	6	
15	XSB3+14BNS	Screw, Power Transistor M'tg	8	
16	XSN3+12FZS	Screw, Power Transistor Socket	8	
17	SMP239-1	Bracket, Lamps	1	*○
18	XTN3+8BFZ	Screw, Lamps Bracket M'tg	1	
19	SMZA6091-1	Bracket, Lamps	2	*
20	SJR205	Terminal Strip	1	
20-1	XTN3+8BFZ	Screw, Terminal Strip M'tg	1	
20-2	XWC3B	Washer, Terminal Strip Screw	1	
21	SMXA32-2	Bushing, Power Transistor	8	*
22	SMXA26	Bushing, Power Transistor Socket	8	*
23	SJVA1202S	Socket, Power Transistor	4	
24	XNG3BFZS	Nut, Power Transistor M'tg	8	
25	SME1	Bracket, Transistor	4	*
26	SHRA520	Label, Thermo	2	
27	XTN3+8BFZ	Screw, Transistor Bracket M'tg	4	
28	SJFA5101	Holder, Fuse	2	
29	XTN3+8BFZ	Screw, Fuse Holder M'tg	2	
29-1	XWC3B	Washer, Fuse Holder Screw	2	
30	XWAR6BFZ	Washer (Spring), Handle	4	
31	XWE6EFZ	Washer, Handle	4	
32	XNA6FFZ	Nut, Handle M'tg	4	
33	SUV331	Cover, Power Transistor	4	*
34	SJF4809	Terminal, Speakers	1	○
35	SJF3213	Terminal, Input	1	○
36 [X, XG, XGH, XGF]	SGP171-2A	Rear Panel	1	○
36 [XSD, XSW]	SGPE9060D	Rear Panel, SGP171-2A with Name Plate (SGT14910)	1	○
36 [XE]	SGPE9060E	Rear Panel, SGP171-3A with Name Plate (SGT15670)	1	○
36 [XM]	SGPE9060Y	Rear Panel, SGP171-2A with Name Plate (SGT15390)	1	○
37	XTN3+8BFZ	Screw, Rear Panel M'tg	4	
38	XWC3B	Washer, Rear Panel Screw	2	
39	XTN3+8BFZ	Screw, Input Terminal M'tg	2	
40	XSB26+5FZ	Screw, Operation Switch M'tg	2	
41	SHR401-1	Latch, Speakers Terminal M'tg	4	
42	SHR595	Bracket, Operation Switch Stopper	1	○
43	SHR127	Bushing, AC Cord (Except set for [XE])	1	
43 [XE] only	SHR131	Bushing, AC Cord	1	
44 [X, XG, XGF, XM]	SJA97	AC Cord, with Plug	1	
44 [XE]	SJA73	AC Cord	1	
44 [XSD, XGH]	SJA81	AC Cord with Plug	1	
44 [XSW]	**SJA68**	AC Cord, with Plug	1	

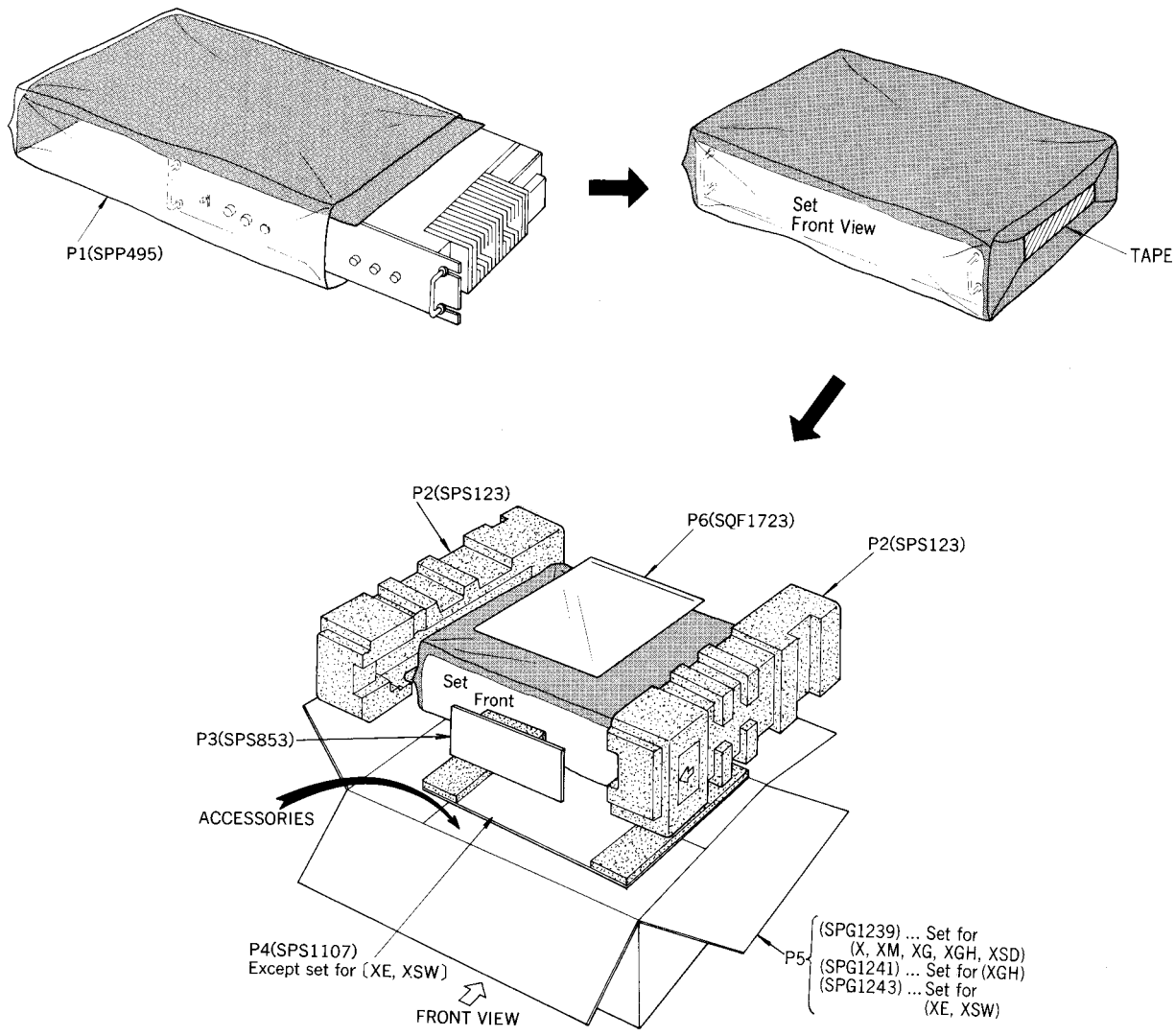
Ref. No.	Part No.	Part Name & Descripiton	Per Set	Remarks
45	SKP5-2	Top Board	1	○
46	XTN3+8BFZ	Screw, Top Board M'tg	8	
47	XWE3FZ	Washer, Top Board Screw	8	
48	SKU5450-1	Bottom Board	1	*○
49	XTN3+8B	Screw, Bottom Board M'tg	8	
50	SKL151	Foot, Bottom Board	4	
51	XTN3+16B	Screw, Foot M'tg	4	
52	SQXA4112	Coution Label, Cabinet Screw	1	
53	XWC3B	Washer, Voltage Selector Switch M'tg	2	
54	XTN3+6FZ	Screw, Voltage Selector Switch Screw	2	
55 [XM] only	SGP9035	Cover, Rear Panel Hole	1	○
ACCESSORIES				
A1	**SJP2129**	Cord, Connection Shield	1	
A2	SKL117	Foot, Bottom Board	4	
A3	RJP5	Pin Plug	4	
A4 [X, XM] only	SJP5213	Plug Adapter, Power	1	
A5 [X, XM] only	SJP5215	Plug Adapter, Power	1	
A6	XTN3+8B	Screw, Adapter Foot M'tg	4	
	XWG3	Washer, Adapter Foot Screw	4	
PACKING PARTS				
P1	SPP495	Soft Cover	1	
P2	SPS123	Pad, Left and Right Side	2	
P3	SPS853	Pad, Front Side	1	
P4	SPS1107	Pad, Bottom Side (Except set for [XE, XSW])	1	○
P5 [X, XM, XG, XGH, XSD]	SPG1239	Carton Box	1	○
P5 [XGF]	SPG1241	Carton Box	1	○
P5 [XE, XSW]	SPG1243	Carton Box	1	○
P6	SQF1723	Instructions Book,Printed Matter	1	○

Notes:
[X] is available in Asia, Latin America, Middle East and Africa only.
[XM] is available in Panama and Mexico only.
[XG] is available in European only.
[XGH] is available in Holland only.
[XSD] is available in Scandinavia only.
[XSW] is available in Switzerland only.
[XE] is available in England only.
[XGF] is available in France only.

■ ACCESSORIES



■ PACKINGS



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